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No. 65

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INCREASED PRODUCTION OF HYBRID DNA VIEWED NOT DANGEROUS

Stockholm NY TEKNIK in Swedish 16 Apr 81 p 4

[Article by Jens Busch]

[Text] Kabi-Gen of Kungsholmen in Stockholm now wishes to increase the scale of its hybrid DNA experiments. The state hybrid DNA commission has taken a position on a memorandum from the company, which wants to increase the scale of production from 10 to 1,000 liters. The reason is that the company now wants to develop a process technology for producing a growth hormone.

Kabi-Gen was previously granted permission to conduct research in hybrid DNA technology to produce a growth hormone on the laboratory scale with volumes up to 10 liters.

The work was classified as P1, the lowest class, which means normal standard laboratories for biological research.

The commission is also classifying the 1,000 liter research as P1. Thus, the risks are not considered to increase with the larget scale of production.

The commission does recommend, however, that the same regulations that apply for hvbrid DNA research with over 10 liters in the United States should apply to the increased activity here.

Well Enclosed

This means, among other things strict requirements for insuring that the microorganisms remain well enclosed in the system and that a plan must be developed for measures in case of possible accidents.

This is the first time such regulations have been considered necessary in Sweden.

The reason why Kabi-Gen now wants to increase the production scale is that work toward developing the microorganisms is now complete.

"Now the process technology must be developed for producing the growth horome and for this it is impossible to work on the 10 liter scale," Kerstin Sirvell of Kabi-Gen said.

She estimates that the process will be fully developed by about 1983 and at that time Kabi-Gen can turn over the remaining work, production of the growth hormone, to its parent company Kabi-Vitrium.

Licensing

The commission has also taken a position on a 1,500 liter Kabi-Vitrium project and its evaluation there is the same as for the 1,000 liter liter Kabi-Gen research.

Next the licensing committee of the Environmental Protection and Occupational Safety Board will decide if the companies will be permitted to increase their research.

Kabi-Vitrium already has the world's largest production of growth hormone, which is now taken from the hypophysis of human corpses, but production is far below demand. Growth hormone is given to children whose growth has been stunted.

9336
CSO: 3102/285

BIOTECHNOLOGY

BRIEFS

PROTEIN FROM CELLULOSE--A method of producing from, among other things, cellulose has been developed in Frankfurt, West Germany. Between 300 and 400 tons of protein per year for animal fodder is now being produced in a pilot plant. In addition to cellulose, the raw materials are paraffin and alcohol. Microorganisms break down the substances in the process. Methods for mass production of microorganisms have also been developed. In the future, project researchers hope to refine the protein mass so that it can also be used in human food. The process will now be tested in a mobile facility in Egypt, where agricultural waste will be used as the raw material. [Text] [Stockholm NY TEKNIK in Swedish 16 Apr 81 p 13] 9336

CSO: 3102/285

ELECTRONICS

FRENCH ELECTRONIC SECTOR CONTINUES TO EXPAND

Essen ELEKTRO-ANZEIGER in German No 6, 1981 pp 13-16

[Excerpt] Since 1967, France has had an Electronic Data Processing Plan, by which this country is striving for self-sufficiency in this sector, just as in the energy sector. After the initial difficulties and various different agreements even on an international level, the large-scale computer activities are concentrated today at CII-Honeywell-Bull. This company now has about 20,000 employees and has now achieved a business turnover of 5 billion francs, about 25 percent in exports. In the sector of minicomputers and peripheral equipment, considerable growth may be found in France, just as in the whole world. Here in France there are about 20 companies with about 8,500 employees, which in 1979 had a turnover of about 3 billion francs. According to the experts, this sector will be reorganized by the Ministry of Industry. To this end, public funds will be allocated, which should have a growth promoting effect. In the sector of software and services, the development in France, according to the conditions in this area, will take place at a much faster rate than in the hardware sector. In 1979, this area employed about 25,000 persons in the mostly small consultant companies with a business turnover of 5.5 billion francs.

With over 260,000 employees, whose percentage in engineers and technicians is only exceeded by the French Aeronautical and Space Industry and a business turnover of altogether 32 billion marks, including almost 40 percent for exports, the entire industrial sector of electronics, communications technology and informatics in France is one of the most dynamic of the French industry. The French Five-Year Plan for IC development for the years 1978-1982 is also based on the realization that in this sector the quality depends on the training of the employees and the hardware or components. There is a special four-year plan for LSI technology. Altogether, five industrial pools have been established for this purpose, concentrating on the different technologies (linear, bipolar circuits, NMOS, CMOS technology, etc.). A special support is provided to promote small and medium size companies in the sector of microelectronics and microprocessing technology.

In connection with this concentrated industrial development, there has been in France since the end of 1978 an Electronic Data Processing Plan for the entire nation, which should take into account the social component of the swift development in electronic data processing and electronics and should help to prevent the adverse consequences for the population.

The problems of technical growth in the data processing and electronics sector are the same as those of the Federal German Republic: in both cases there is a shortage of engineers. Increased recruiting of high school graduates, measures by the industry in the area of further training and the entire educational system are being organized to train the proper instructors and experts. But in France there is a certain fear of training too many experts in this field, so that the supply is somewhat less than the demand. From the French viewpoint, it is interesting to note that the situation on the Federal German market was estimated better than in this country.

With regard to the German electronics and computer industry, however, the French industry in this sector sees itself not basically as a rival, but as a partner. Germany is the primary partner in commercial exchanges; moveover, the markets are very extensive and different; also, against the background of American and Japanese competition, French industry can only seek cooperation in Europe. Examples may be mentioned in the collaboration between CII-Honeywell-Bull and Siemens in the ADA sector, also OEM agreements which provide already today a suitable compatibility. the same is also true of collaboration in the sector of standards.

Communications Technology With Ambitious Programs

The times, when the situation in the telephone sector was described with the joke: "There are some who wait for the telephone, and those who wait for the dialing tone" are now past in France. A rapid increase of the density of connections and the restructuring to a modern network with digital transfer and transmission technology is in full swing. The 1974 development plan with its three goals: development of a powerful telecommunications industry, improvement in the communication facilities in the course of the regional development planning and high quality of telephone connections has led to considerable investments of 120 billion francs in the Five-Year-Plan period up to 1980. The objective of new connections every year for 2 million subscribers is proceeding according to plan and has led from 6.2 million connections in 1974 to 16 million subscribers at this time. In 1982, the 20 million level will be exceeded, and in 10 more years, 34 million connections will be achieved.

Besides this expansion of the network, another element is the digitalization of the system. This would provide the prerequisites for what the French call "telematique," the association of telecommunications and data processing. The infrastructure and the new services which will be created in this sector, include, for example, Transpac, a data transmission system which since 1978 has covered the whole of France and now has 4,500 subscribers. In 1983, the communications satellite TDF 1 will be put into service, through which it will be possible to transmit large amounts of data, a service which the French Government will take upon itself, but should also allow large companies, and not only French ones, to achieve fast world wide data exchange.

In the systems sector, efforts are also being made to put into service luminous waveguides: an experimental glass fiber line already exists between two stations in Paris, a remote connection is planned, and by 1989 Biarritz will have a cable system based on glass fiber technology and thus allow telephone and video transmission for the private sector.

In the sector of "New Media" some experiments are also being conducted now in France: Antiope (Videotext in the Federal German Republic) and Teletel (picture screen text) are under trial operation. In Velizy in Paris this year about 2,000 subscribers have begun a field test (Velizy is, by the way, the location of the Thomson-CSF company which is taking a decisive part in this development). A large-scale experiment under realistic conditions is to begin towards the end of the year in a western department in France: 250,000 telephone subscribers will have an electronic telephone directory with which, by means of a small display with keyboard developed by the French industry itself, it will be possible to obtain the telephone numbers of other subscribers, and also to receive a telescreen text. It is learned that the Media and Telematics systems will include services such as telecopying (Telefax), telephone conferences, remote writing and remote text processing, etc.

Seen as a whole, this program has two effects: on one hand, quick adjustment and improvement of the internal French communications picture, and secondly an increasing importance of the French companies in the telecommunications sector on the international market. Meanwhile the exports in this area are about 700 million marks with increasing growth rates.

9018
CSO: 3102/267

MICROPROCESSORS: THIRTY-FIVE MAKERS, ONE HUNDRED TYPES

Paris ELECTRONIQUE INDUSTRIELLE in French 1 May 81 pp 29-39

[Article by H. Lilen]

> [Text] Thirty-five manufacturers throughout the world produce 100 families or types of microprocessors, which seems excessive to many. The market will most likely settle in the next few years with a secondary spill-off toward 16 bits. This explains the fierce battle being waged by producers.

Microprocessors, which apparently are the least in the news, are paradoxically the ones with the largest markets in terms of number of units: the 4 bits, and more specifically 4-bit microcalculators with memories and input-output devices on the same chip. Their sales went up to some hundred million units in 1980, or about two-thirds of total sales of microprocessors. Ranking first among them are the TMS 1000 of Texas Instruments, with more than 50 million produced, a good part of them in France, at Villeneuve-Loubet. They are followed by microprocessors such as National Semiconductor's COPS.

In contrast, the 16-bit circuits, only about 1 million of which were marketed in 1980, have brought on a lot of excitement and made torrents of ink flow. The younger 32 bits have aroused a great deal of curiosity for the moment and we know that most of the large corporations are waiting for the iAPX 432 samples so that they can begin evaluating them and projecting possible applications. Competition is, however, still nonexistent here, although three companies have introduced 32 bits: Intel, for one, but also Bell Laboratories and Hewlett Packard, the latter two apparently for their own markets.

Thus the 1980 market amounted to about 50 million 8-bit microprocessors, including the category of microcalculators (with storage and I/O on the chip) which recorded remarkable growth. These units respond in fact to the need for large series applications, of a type geared for the general public, for instance, and are represented by the 8048, 3870, and the very recent 8051 which Intel just issued in sample form and which has a 32 K dead memory on the chip, or also the Motorola 6805, among others.

This market seems to be so large that Texas Instruments, which appeared to have reached an impasse with the 8 bits, has come back with the 7000 family of microprogrammable microcalculators.

Who's Producing What?

This magazine normally makes a survey of microprocessor production by listing the units in charts alphabetically, by manufacturer.

This time, the number of manufacturers has increased somewhat, primarily for two reasons. First, the French integrated circuit plan has been implemented and the following new units have begun production:

Thomson-Efcis in Grenoble, a result of the partnership between Thomson-CSF and CEA, which is producing NMOS [Nonvolatile Metal Oxide Semiconductor] type units as a second source for Motorola. You will recall that Efcis is also known for its production of quite remarkable SOS (silicon-on-sapphire) products for very elaborate applications;

Matra-Harris Semiconductors (MHS), a partnership owned 51 percent by Matra and 49 percent by Harris Semiconductors, whose plant in Nantes began operations in 1981 with CMOS [Complementary Metal Oxide Semiconductor] products, including memories to start with;

Eurotechnique, a result of the partnership between Saint-Gobain Pont-à-Mousson (51 percent) and National Semiconductors (NS) with 49 percent. Their most recent factory, installed near Aix-en-Provence, also started production at the end of 1980. Their first products were memory units using NMOS technology.

These last two groups will also be producing microprocessors, and the first ones are supposed to be out by the end of the year. The tables which follow give a preview listing.

To have the complete picture, one must also add to these new arrivals the microelectronic center which was inaugurated in Grenoble on 24 February 1981 by CNET [National Center for Telecommunications Studies], but which will not be producing integrated circuits. One might legitimately wonder what else they might be able to contribute and at what price, as the other corporations have a considerable advantage in their production experience.

The second reason for this increase in firms is that Japanese microprocessors have now found their way into France, discreetly perhaps for a beginning. Hence, besides Fujitsu, Hitachi and NEC, you can also find Matsushita, OKI and Toshiba in these charts.

All the microprocessors referred to have been classified into three main families:

(1) Basic microprocessors, i.e., the central processing units (CPU) on a chip, marked u P;

(2) Wafer systems, especially the TTL and ECL bipolar systems, marked u T;

(3) Microcalculators (u C) or microsystems, which have the CPU, memories, I/O, etc. on a single circuit.

The length of the word being processed and the technological family, if applicable, are also indicated, and a few remarks are made in the column entitled "Comments." More specifically, the year the product is marketed might be indicated, which is an important piece of information when the products are only announced and will not be available until later. Obviously the year noted is the one given by the manufacturer.

These charts will thus show the second sources which are constantly changing. Let's look at what they are for the 16-bit microprocessors.

Sixteen-Bit Microprocessors

The chart of second sources for 16-bit microprocessors shows that there is already a good supply of them.

One of the most recent announcements regards the agreements signed between Signetics-Philips and Motorola for the 68000. The Philips group has been producing a whole line of Intel microprocessors as a second source, so this agreement was surprising. For RTC, it was a wise choice designed to "extend the line." Thomson-Efcis, at the news of this new competitor, made the best of it: "The choice of Philips confirms that we have made the right choice and will help assure the success of the 68000."

In fact, Signetics is announcing that the first samples of the 68000 will be ready in mid-1981, while Thomson-Efcis will not be able to market them until 1982, even though last year the company said they would be ready this year. The reason for this is that Thomson-Efcis wants to skip one step and produce this highly complex circuit directly in HMOS-II technology, moving immediately into the same position as the first source, at the same time. You will recall in this connection that Thomson-Efcis had a turnover of 174 million francs in 1980 as compared with 1 million francs the previous year. Next September, jointly with Thomson-CSF, it is supposed to set up a new center in Grenoble for designing circuits to order.

At present, the most widely distributed of the 16 bits seem to be those of Intel and Texas Instruments. The latter company is currently sending out more and more announcements of new products in the 9900 family: the 9995 (described in our issue No 12), as well as the brand new 99000.

The CMOS version of the 8086 is being developed by MHS in Nantes and by Harris. Coming up, we have National Semiconductor's 16000 which already exists in the form of laboratory samples but which, at the writing of this article, was undergoing final adjustments. It will be second-sourced by Eurotechnique and Fairchild (the Schlumberger group).

There are of course other 16 bits, which were mentioned in our 13th issue and which also have been included in the charts.

Forecast

One way to try to evaluate prospects for microprocessors is to look at the development of their markets. In absolute values, this market went from zero in 1970 to

120 to 150 million products in 1980, with the 4-bit units--usually of the PMOS [P-Channel Metal Oxide Semiconductor] type--taking the incontestable lead! This PMOS technology is perhaps "old" and "outdated," but it has been perfectly mastered, is easy to produce, well tested, and obtains excellent returns for manufacturers who thus have a particular affinity for it. For the user, the most important thing is in fact not the technology, which could even become a transparent idea, but the specifications, performance, price and delivery time. All of these factors argue in favor of the PMOS.

On the other hand, among the 8 and 16 bits, the NMOS has moved back up to the top and has cornered almost the entire market, because the circuits are expected to give higher performances. As for the CMOS, highly anticipated by users, the results have been very disappointing for manufacturers. Some didn't believe in them--Intel was the first a few years ago, but a sudden about-face seems to be occurring now. Others announced products that they were unable to manufacture. This market could nevertheless be very large, and the new French company, MHS, is in fact counting on this potential market. The CMOS are actually more expensive than the NMOS, but apparently the price differential can be very quickly recovered if only through the power supply. Moreover, the fact that it consumes less means less calories are used up and therefore operating conditions are more reliable. The emergency power system, in case of power failure, is also provided for with much more moderate constraints. Finally, the last but not least argument in favor of the CMOS is its excellent noise immunity which, don't forget, amounts to 45 percent of the power supply voltage, or 2.25V max under 5V and 4.5V max under 10V. Manufacturers guarantee 30 percent in the least favorable cases. In an industrial context, this is a highly appreciated quality.

Another focus of future development is the creation of markets for the general public, with computerized home systems, the so-called "brown" goods (TV, radio, hi-fi, etc), the automobile and telephone, as well as leisure activities in general and small machines such as sewing machines and the like which require mass production. It is said humorously that in the near future you will no longer be able to buy an electric coffee grinder which is not a microprocessor! But maybe we should take this seriously!

It is the microcalculators which are typically used for these applications, with a clear trend in favor of the more powerful ones, or 8 bits for a start. Cases other than the traditional dual-in-line may be needed (telephones, toys, etc.).

Another trend is to include in the microcalculator specific interfaces, such as analog-to-digital converters, or vice versa. We have even heard mention of analog microprocessors for some of them. Others include a phase-locked loop (the American "PLL"), such as one of the Motorola 6805's.

As for the 16 bits, they are off in conquest of their markets, frequently to the detriment of the 8 bits in percentage of applications, but not in absolute sales figures, since the markets continue to increase at a tremendous speed. But at the very top of the product line appear the 32 bits, still objects of curiosity, but for how much longer?

These circuits, while becoming more and more complex, must at the same time be increasingly easier to use, which is no small contradiction. They are accompanied by specialized processors or "co-processors" which make them much more efficient.

In the case of the iAPX 432 (Intel's 32-bit circuit), although application requires more power, all that is needed is to plug in one more microprocessor, parallel to the first, without any further ado.

Finally, the software will increasingly be fixed in the silicon of the circuits to facilitate their use and to save programming time: monitors or operation systems, or languages such as Ada (these subjects were referred to in the 1 April issue).

The objective is important: to reduce the time needed for programming the systems. This becomes more and more imperative in our post-industrial society where specialized, highly skilled labor is cruelly lacking. The shortage of software specialists or engineers will apparently only grow in coming years and, as ambitious as they appear, government training projects--which take shape during an electoral campaign to boot--do not seem to be able to fill the gap in the short term. A more industry-oriented approach is perhaps called for.

1981 MICROPROCESSOR PRODUCTION

(by alphabetical order of manufacturers)

Type	Word length (bits)	Technology	uP	uT	uC	Comments
AMCC						
AMCC 1250	4	CMOS			●	On bare chip
AMD						
AM 2901	4	LS		●		
AM 2903	4	LS		●		
AM 29116	16	LS	●			1981 (?)
AM 8080	8	NMOS	●			8080 family
AM 8035	8	NMOS			●	
AM 8048	8	NMOS			●	
AM 8049	8	NMOS			●	
AM 8085	8	NMOS	●			
AM 9080	8	NMOS	●			
Z 8001	16	NMOS	●			
Z 8002	16	NMOS	●			
AMI						
S 2000	4	NMOS			●	LED Cde
S 2000/A	4	NMOS			●	32V lighted display Cde
S 2150	4	NMOS			●	LED Vde
S 2150/A	4	NMOS			●	
S 2200 •	4	NMOS			●	32V ltd. displ.
S 2200/A	4	NMOS			●	with A/D converter
S 2210	4	NMOS			●	A/D converter, 32 V display
S 2400	4	NMOS			●	A/D converter
S 2400/A	4	NMOS			●	with A/D converter and 32V display
S 6800	8	NMOS	●			
S 68A00	8	NMOS	●			
S 68B00	8	NMOS	●			
S 68H00	8	NMOS	●			2.5 MHz
S 6801	8	NMOS			●	
S 6802	8	NMOS	●			
S 68A02	8	NMOS			●	1.5 MHz
S 6805	8	NMOS			●	
S 6808	8	NMOS	●			
S 6809	8	NMOS	●			
S 68A09	8	NMOS	●			
S 68B09	8	NMOS	●			
S 9900	16	NMOS	●			
S 9940	16	NMOS			●	
S 9980	16	NMOS	●			
S 9981	16	NMOS	●			internal clock
6809C	8	CMOS	●			6809 in CMOS (1982 ?)
2811	16	VMOS			●	analog processor (SPP)
S 4200	4	CMOS			●	2200 type 1982
EUROSIL						
e 3100	4	CMOS			●	
EUROTECHNIQUE						
8048	4	NMOS			●	1981
8049	8	NMOS			●	1981
8050	8	NMOS			●	1981
80C48	8	CMOS			●	
400	4	NMOS			●	COP family
410	4	NMOS			●	1981
420	4	NMOS			●	1981
444	4	NMOS			●	1981
400 C	4	CMOS			●	1982
16 000	16	XMOS	●			1982
NSC 800	8	CMOS	●			1982
FAIRCHILD						
F 6800	8	NMOS	●			
F 6801	8	NMOS			●	
F 6802	8	NMOS	●			6802 without RAM
F 6808	8	NMOS	●			
F 6882	8	NMOS	●			
F 6809	8	NMOS	●			
F 3850	8	NMOS	●			(F8)
F 3870	8	NMOS			●	
F 38E70	8	NMOS			●	with EPROM
F 3872	8	NMOS			●	
F 3876	8	NMOS			●	
F 3878	8	NMOS			●	without ROM
F 9400	4	LS		●		
F 9445	16	I3L	●			
F 100 K	8	ECL		●		Addition in 25 ns
2900	4	TTL/S		●		
16 000	16	NMOS	●			Second source of NS (1982)

Type	Word length (bits)	Technology	Category uP	uT	uC	Comments
FUJITSU (ERN)						
MBL 6800 N	8	NMOS	●			1 MHz
MBL 6800 E	8	NMOS	●			1,5 MHz
MBL 6800 H	8	NMOS	●			2 MHz
MBL 6801	8	NMOS			●	1 MHz
MBL 6802 N	8	NMOS			●	1 MHz
MBL 6802 E	8	NMOS			●	1,5 MHz
MBL 6802 H	8	NMOS			●	2 MHz
MBL 8041 N	8	NMOS			●	UPI, 6 MHz
MBL 8041 E	8	NMOS			●	8 MHz
MBL 8041 H	8	NMOS			●	11 MHz
MBL 8048 N	8	NMOS			●	6 MHz
MBL 8048 E	8	NMOS			●	8 MHz
MBL 8048 H	8	NMOS			●	11 MHz
MBL 8035	8	NMOS			●	8 MHz
MBL 8049 N	8	NMOS			●	6 MHz
MBL 8049 E	8	NMOS			●	8 MHz
MBL 8049 H	8	NMOS			●	11 MHz
MBL 8039	8	NMOS			●	8 MHz
MBL 6803	8	NMOS			●	
MBL 6809	8	NMOS	●			1981
MBL 8086	16	NMOS	●			1981
MB 8841	4	NMOS			●	
MB 8842	4	NMOS			●	
MB 8843	4	NMOS			●	
MB 8844	4	NMOS			●	
MB 8845	4	NMOS			●	
MB 8846	4	NMOS			●	
MB 8847	4	NMOS			●	
MB 8848	4	NMOS			●	
MB 8849	4	NMOS			●	for evaluatio
MB 8851	4	CMOS			●	
MB 8851A	4	CMOS			●	
MB 8851L	4	CMOS			●	
MB 8853	4	CMOS			●	
MB 8854	4	CMOS			●	
MB 8855	4	CMOS			●	
MB 8858	4	CMOS			●	
GENERAL INSTRUMENT (PEP)						
CP 1600	16	NMOS	●			
CP 1600/A	16	NMOS	●			
CP 1610	16	NMOS	●			
PIC 1650 A	8	NMOS			●	
PIC 1655 A	8	NMOS			●	
PIC 1656	8	NMOS			●	
PIC 1664	8	NMOS			●	external ROM
PIC16C55	8	CMOS			●	1655 in CMOS

Type	Word length (bits)	Technology	Category uP	uT	uC	Comments
HARRIS						
HM 6100	12	CMOS	●			4 MHz
HM 6100A	12	CMOS	●			8 MHz
HM 6100C	12	CMOS	●			3,3 MHz
80C85	8	CMOS	●			1982 ?
80C86	16	CMOS	●			1982 ?
HITACHI (Diode France)						
68 000	16	HMOS	●			
6800	8	NMOS	●			
6802	8	NMOS			●	
6803	8	NMOS			●	
6809	8	NMOS	●			1982 ?
68A09	8	NMOS	●			
68B09	8	NMOS	●			
68A00	8	NMOS	●			
68B00	8	NMOS	●			
6801	8	NMOS			●	
6805	8	NMOS			●	
6805R2	8	NMOS			●	
HMCS 42	4	NMOS			●	
HMCS 42C	4	NMOS			●	
HMCS 43	4	NMOS			●	
HMCS 43C	4	NMOS			●	
HMCS 44A	4	NMOS			●	
HMCS 44C	4	NMOS			●	
HMCS 44N	4	NMOS			●	
HMCS 45A	4	NMOS			●	
HMCS 45C	4	NMOS			●	
HMCS 46A	4	NMOS			●	
HMCS 46C	4	NMOS			●	
HMCS 47C	4	NMOS			●	

Type	[illegible]	[illegible]	Category			Comments
			µP	µI	µC	
INTEL						
4004	4	PMOS	●			
4040	4	PMOS	●			
8008	8	PMOS	●			
8008-1	8	PMOS	●			
8080 A	8	NMOS	●			
8080 A-1	8	NMOS	●			
8080 A-2	8	NMOS	●			
8021	8	NMOS			●	
8022	8	NMOS			●	with A/D converter
8048	8	NMOS			●	
8648	8	NMOS			●	
8748	8	NMOS			●	with EPROM
8035	8	NMOS			●	
8049	8	NMOS			●	
8039	8	NMOS			●	
8051	8	NMOS			●	32 K ROM
8085 A	8	NMOS	●			
8085A-2	8	HMOS	●			
8041 A	8	NMOS			●	or UPI
8741 A	8	NMOS			●	UPI with EPROM
8749	8	HMOS			●	with EPROM (1981)
8086	16	HMOS	●			
8088	8	HMOS	●			
8089	16	HMOS	●			I/O Processor
8087	16	NMOS	●			mathematical processor
2920	25	HMOS			●	"analog" processor
Families						Acc. to new Intel designs (see No. 1)
MCS 51	8	NMOS			●	
MCS 48	8	HMOS			●	
iAPX 86	16	HMOS	●			
iAPX 88	8	HMOS	●			
iAPX 186	16	HMOS	●			
iAPX 286	16	HMOS	●			
iAPX 432	32	HMOS	●			
INTERSIL						
IM 6100	12	CMOS	●			
IM 80C41	8	CMOS			●	Intel's UPI
IM 80C48	8	CMOS			●	8048
IM 80C49	8	CMOS			●	8049
IM 80C35	8	CMOS			●	80C48-no ROM
IM 80C48	8	CMOS			●	1981
ITT - Intermetall						
SAA 6000	4	CMOS			●	special applications (Family)
9900	16	NMOS	●			= 9900 Texas
9940	16	NMOS			●	
9980	8	NMOS	●			
9981	8	NMOS	●			
9995	16	NMOS	●			1982
MATSUSHITA (CCI)						
MN 1542	4	NMOS			●	homogenous 1400 family
MN 1544	4	NMOS			●	
MN 1562	4	NMOS			●	
MN 1564	4	NMOS			●	
MN 1599	4	NMOS			●	for development
MHS						
6100	12	CMOS	●			Matra-Harris semiconductors
80C48	8	CMOS			●	for 1981 production
87C48	8	CMOS			●	
80C21	8	CMOS			●	
80C49	8	CMOS			●	
80C86	16	CMOS			●	1982
MOS Technology (Procep)						
6502	8	NMOS	●			6500 family
6503	8	NMOS	●			
6504	8	NMOS	●			

Type	Word length (bits)	Technology	Category			Comments
			µP	µT	µC	
MOSTEK						
MK 3870/10	8	NMOS			●	homogenous family 387/X
MK 3870/12	8	NMOS			●	
MK 3870/20	8	NMOS			●	
MK 3870/22	8	NMOS			●	
MK 3870/30	8	NMOS			●	
MK 3870/32	8	NMOS			●	
MK 3870/40	8	NMOS			●	
MK 3870/42	8	NMOS			●	
MK 3872	8	NMOS			●	
MK 3873/10	8	NMOS			●	3870 with I/O series for telecommunications
MK 3873/12	8	NMOS			●	
MK 3873/20	8	NMOS			●	
MK 3873/22	8	NMOS			●	
MK 3874	8	NMOS			●	
MK 3875/22	8	NMOS			●	protected RAM
MK 3875/42	8	NMOS			●	
MK 3876	8	NMOS			●	
MK 38P70/02	8	NMOS			●	« Piggy back »
MK 38P73/02	8	NMOS			●	
MK 38C70	8	CMOS			●	3870 in CMOS (1982)
MK 38CP70	8	CMOS			●	
SCU-1	8	NMOS			●	intelligent controllers based on 3870/73
SCU-21	8	NMOS			●	
SCU-22	8	NMOS			●	
SCU-23	8	NMOS			●	
SCU-24	8	NMOS			●	
MK 3880	8	NMOS	●			= Z80
MK 8086	16	NMOS	●			= 8086
MK 68 000	16	NMOS	●			

Type	Word length (bits)	Technology	Category			Comments
			µP	µT	µC	
MOTOROLA						
2901	4	TTL/S		●		
3870	8	NMOS			●	
6800	8	NMOS	●			
68A00	8	NMOS	●			
68B00	8	NMOS	●			
6801	8	NMOS			●	
68701	8	NMOS			●	6801 with EPROM
6802	8	NMOS	●			
6803	8	NMOS			●	6801-no ROM
6808	8	NMOS	●			6802-no RAM
6809	8	NMOS	●			1 MHz
6809 E	8	NMOS	●			extern. clock
68A09	8	NMOS	●			1.5 MHz
68B09	8	NMOS	●			2 MHz
68000	16	NMOS	●			4,6 or 8 MHz
10800	4	ECL		●		
141000	4	CMOS			●	
141200	4	CMOS			●	
146805	8	CMOS			●	6805 in CMOS
14500 B	1	NMOS	●			Boolean
6805-P2	8	NMOS			●	1100 octets ROM
6805-U2	8	NMOS			●	2 Ko of ROM
6805-R2	8	NMOS			●	A/D converter, 4 channels
6805-T2	8	NMOS			●	with PLL (1981)
6805-T1	8	NMOS			●	T2, 1.8Ko ROM
6805-T3	8	NMOS			●	T2, 3.5Ko ROM
68705-P3	8	NMOS			●	with EPROM
146805-E2	8	CMOS			●	external address

Type	Word length (bits)	Techno logy	Category uP	uT	uC	Comments
NATIONAL SEMICONDUCTOR						
INS 8080A	8	NMOS	●			
INS 8048	8	NMOS			●	1 Ko of ROM
INS 8049	8	NMOS			●	2 Ko of ROM
INS 8050	8	NMOS			●	4 Ko of ROM
INS 8035	8	NMOS			●	8048- no ROM
INS 8039	8	NMOS			●	8049--no ROM
INS 8040	8	NMOS			●	8050--no ROM
INS 8900	16	NMOS	●			or PACE
INS 8060	8	NMOS	●			SC/MP
NS 16 000	16	XMOS	●			for 1981
NSC 800	8	CMOS	●			1981
402	4	NMOS			●	without ROM
402 M	4	NMOS			●	without ROM
404 L	4	NMOS			●	without ROM
410 L	4	NMOS			●	family
411 L	4	NMOS			●	COP
420	4	NMOS			●	
420 L	4	NMOS			●	
420 C	4	CMOS			●	
421	4	NMOS			●	
421 L	4	NMOS			●	
421 C	4	CMOS			●	
440	4	NMOS			●	
444 L	4	NMOS			●	
445 L	4	NMOS			●	
2440	4	NMOS			●	Double CPU, 1981
INS 8070	8	NMOS			●	without ROM
INS 8072	8	NMOS			●	2.5 K of ROM
INS 8073	8	NMOS			●	(see EAI 280)
INS 8074	8	NMOS			●	4 K of ROM
INS 2900 A-2	4	TTL/S	●			
INS 8051	8	NMOS			●	32 K of ROM
80C48	8	CMOS			●	1982 ?
NS 16032	16	XMOS	●			16 Mo address
NS 16016	16	XMOS	●			40 pin case
NS 16008	8	XMOS	●			16016 byproduct
NS 16081	16	XMOS	●			arithmetic processor

Type	Word length (bits)	Techno logy	Category uP	uT	uC	Comments
NEC						
µPD-7801	8	NMOS			●	4 Ko of ROM
µPD-8021	8	NMOS			●	
µPD-8035	8	NMOS			●	
µPD-8039	8	NMOS			●	
µPD-8041	8	NMOS			●	- UPI
µPD-8048	8	NMOS			●	
µPD-8049	8	NMOS			●	
µPD-8080F	8	NMOS	●			2 MHz
µPD-8080AF1	8	NMOS	●			3 MHz
µPD-8080AF2	8	NMOS	●			2,5 MHz
µPD-8085 A	8	NMOS	●			3 MHz
µPD-8085 A-2	8	NMOS	●			5 MHz
µPD-8741A	8	NMOS			●	with EPROM
µPD-8748	8	NMOS			●	with EPROM
µPD-8022	8	NMOS			●	with A/D converter
µPD-8086	16	NMOS	●			5 MHz
µPD-546C	4	NMOS			●	- µCOM 43
µPD-547C	4	NMOS			●	- µCOM 44
µPD-547LC	4	NMOS			●	- µCOM 44
µPD-548C	4	NMOS			●	- µCOM 42
µPD-550C	4	NMOS			●	- µCOM 45
µPD-552C	4	NMOS			●	- µCOM 44
µPD-553C	4	NMOS			●	- µCOM 43
µPD-554C	4	NMOS			●	- µCOM 45
µPD-556	4	NMOS			●	Evaluation
µPD-650C	4	CMOS			●	- µCOM 43
µPD-651C	4	CMOS			●	- µCOM 44
µPD-652C	4	CMOS			●	- µCOM 45
µPD-7500	4	CMOS			●	« Evachip »
µPD-7501	4	CMOS			●	LCD Cde
µPD-7502	4	CMOS			●	address 12 LED display
µPD-7503	4	CMOS			●	LCD Cde//units
µPD-7507	4	CMOS			●	- µCOM 75
µPD-7520	4	PMOS			●	address-6 LED display units
µPB-2901	4	Schottky		●		
µCOM-16N	16	NMOS	●			- µPD-768 B
µPD-780	8	NMOS	●			- Z80
µPD-80C48	8	CMOS			●	1981
µPD-80C35	8	CMOS			●	1982
µPD-80C39	8	CMOS			●	external mem.
µPD-87C48	8	CMOS			●	1983
µPD-7720	16	NMOS			●	analog processor
µPD-7801	8	NMOS			●	
µPD-7802	8	NMOS			●	
µPD-75C06	8	CMOS			●	7801 en CMOS
µPD-75C08	8	CMOS			●	

Type	Word length (bits)	Technology	Category uP	uT	uC	Comments
OKI (Techni-Import)						
MSM 5840 RS	4	CMOS			•	
MSM 5842 RS	4	CMOS			•	
MSM 5845 RS	4	CMOS			•	
MSM 58421 GS	4	CMOS			•	with LCD driver
MSM 58422 RS	4	CMOS			•	with 12 x 12 driver matrices
MSM 5832	4	CMOS			•	for clock-makers
Philips-France, Signetics						
FAST 1	16	NMOS	•			64 K address segmented, 16 [illegible] address
FAST 2	16	NMOS	•			
RCA						
CDP 1802	8	CMOS	•		·	called COSMAC
CDP 1802/A	8	CMOS	•			
CDP 1803	8	CMOS	•			simplified 1802
CDP 1804	8	CMOS/SOS			•	1802 in 8 MHz microsystem
CPD 1805	8	CMOS	•			
ROCKWELL						
PPS-4	4	PMOS	•			
MM 75	4	PMOS			•	PPS-4/1 family
MM 76	4	PMOS			•	
MM 76C	4	PMOS			•	
MM 76E	4	PMOS			•	
MM 76L	4	PMOS			•	
MM 76EL	4	PMOS			•	
MM 77	4	PMOS			•	
MM 77L	4	PMOS			•	
MM 78	4	PMOS			•	
MM 78L	4	PMOS			•	
MM 78A/D	4	PMOS			•	with 2 A/D converters
PPS-4/2	4	PMOS	•			
PPS-8	8	PMOS	•			
PPS-8/2	8	PMOS	•			
R 6502	8	NMOS	•			6500 family
R 6503	8	NMOS	•			
R 6504	8	NMOS	•			
R 6505	8	NMOS	•			
R 6506	8	NMOS	•			
R 6507	8	NMOS	•			
R 6512	8	NMOS	•			
R 6513	8	NMOS	•			
R 6514	8	NMOS	•			
R 6515	8	NMOS	•			
R 6500-1	8	NMOS			•	
68000	16	HMOS	•			for 1981

Type	Word length (bits)	Technology	Category uP	uT	uC	Comments
RTC-SIGNETICS						
2650 A	8	NMOS	•			
2650 A-1	8	NMOS	•			
8021	8	NMOS			•	
8035	8	NMOS			•	
8048	8	NMOS			•	
8039	8	NMOS			•	
8049	8	NMOS			•	
8041	8	NMOS			•	= UPI
8405	8	NMOS			•	8400 family (1981)
8410	8	NMOS			•	
8420	8	NMOS			•	
8440	8	NMOS			•	
8400	8	NMOS			•	"piggy back" version
68000	16	NMOS	•			
SGS - ATES						
3870 A	8	NMOS			•	
3872	8	NMOS			•	
3874	8	NMOS			•	
Z8	8	NMOS			•	
Z80	8	NMOS	•			
Z 8000	16	NMOS	•			
SIEMENS						
SAB 8021	8	NMOS			•	
SAB 8035	8	NMOS			•	
SAB 8041	8	NMOS			•	
SAB 8048	8	NMOS			•	
SAB 8049	8	NMOS			•	
SAB 8080	8	NMOS	•			
SAB 8085	8	NMOS	•			
SAB 8086	16	NMOS	•			
SAB 8051	8	NMOS			•	4 Ko of ROM
SAB 8039	8	NMOS			•	
SAB 8031	8	NMOS			•	
SDA 2010	8	NMOS			•	Based on 3021
SDA 2110	8	NMOS			•	
SDA 3010	8	NMOS			•	without ROM
SDA 3110	8	NMOS			•	without ROM
SAB 80215	8	NMOS			•	with 3 A/D converters
SAB 80210	8	NMOS			•	v. turn-counter
SAB 80315	8	NMOS			•	without ROM
SAB 80310	8	NMOS			•	without ROM
SAB 2920	25	NMOS			•	analog processor
SAB 8022	8	NMOS			•	
SAB 8741	8	NMOS			•	
SAB 8748	8	NMOS			•	with EPROM

Type	Word length (bits)	Techno-logy	Category uP	uT	uC	Comments
SYNERTEK (ERN)						
SY 6502	8	NMOS	●			6500 family
SY 6503	8	NMOS	●			
SY 6504	8	NMOS	●			
SY 6505	8	NMOS	●			
SY 6506	8	NMOS	●			
SY 6507	8	NMOS	●			
SY 6512	8	NMOS	●			
SY 6513	8	NMOS	●			
SY 6514	8	NMOS	●			
SY 6515	8	NMOS	●			
Z8	8	NMOS			●	
TEXAS INSTRUMENTS						
TMS 9900	16	NMOS	●			3 MHz clock
TMS 9900-40	16	NMOS	●			4 MHz clock
TMS 9980	8	NMOS	●			
TMS 9981	16	NMOS	●			9980, clock
TMS 9985	16	NMOS	●			
TMS 9940	16	NMOS			●	
SBP 9900	16	I2L	●			2 MHz clock
SBP 9900A	16	I2L	●			3 MHz clock
TMS 9989	16	NMOS	●			military 9900
TMS 8080	8	NMOS	●			
TMS 1000P	4	PMOS			●	TMS 1000 type
TMS 1100P	4	PMOS			●	under 15 V
TMS 1200P	4	PMOS			●	
TMS 1300P	4	PMOS			●	
TMS 1400P	4	PMOS			●	
TMS 1000 L	4	PMOS			●	TMS 1000 type
TMS 1100 L	4	PMOS			●	under 9 v
TMS 1200 L	4	PMOS			●	
TMS 1300 L	4	PMOS			●	
TMS 1400 L	4	PMOS			●	
TMS 1600 L	4	PMOS			●	
TMS 1700 L	4	PMOS			●	
TMS 1000 H	4	PMOS			●	TMS 1000 type
TMS 1040 H	4	PMOS			●	35 V output
TMS 1100 H	4	PMOS			●	
TMS 1200 H	4	PMOS			●	
TMS 1300 H	4	PMOS			●	
TMS 1400 H	4	PMOS			●	
TMS 1600 H	4	PMOS			●	
TMS 1000 C	4	CMOS			●	TMS 1000 in CMOS
TMS 1100 C	4	CMOS			●	
TMS 1200 C	4	CMOS			●	
TMS 1300 C	4	CMOS			●	
TMS 2100	4	PMOS			●	with A/D converter
TMS 9995	16	NMOS	●			1981 - 12 MHz
TMS 99000	16	NMOS	●			1981 - 24 MHz
TMS 7000	8	NMOS			●	1981

Type	Word length (bits)	Techno-logy	Category uP	uT	uC	Comments
THOMSON-CSF (ex-Sescosem)						
2901	4	Schottky		●		
THOMSON - EFCIS						
EF 6800	8	NMOS	●			
EF 6801	8	NMOS			●	
EF 6801 E	8	NMOS			●	6801 with external clock
EF 6801C1	8	NMOS			●	6801 for eval.
EF 6802	8	NMOS	●			
EF 6803	8	NMOS			●	6801--no ROM
EF 6803 E	8	NMOS			●	6803 with external clock
EF 6805P2	8	NMOS			●	
EF 6805P2 C1	8	NMOS			●	6805 for eval.
EF 6808	8	NMOS	●			6802--no RAM
EF 6809	8	NMOS	●			
EF 68000	16	NMOS	●			1982
TOSHIBA						
TMP 4300C	4	NMOS			●	
TMP 4310AP	4	NMOS			●	
TMP 4315BP	4	NMOS			●	
TMP 4320AP	4	NMOS			●	
TCP 4600AC	4	CMOS			●	
TCP 4620	4	CMOS			●	
TCP 4630	4	CMOS			●	
TMP 8048	8	NMOS			●	
TMP 8035	8	NMOS			●	
TMP 8049	8	NMOS			●	
TMP 8039	8	NMOS			●	
TCP 8048	8	CMOS			●	1981
TCP 8039	8	CMOS			●	1981
TMP 8080A	8	NMOS	●			– 8080
TMP 8085A	8	NMOS	●			
WESTERN DIGITAL (Technology Ressources)						
MCP 1600	16	NMOS	●			~LSI-11, DEC
WD 9000	16	NMOS	●			Specialized Pascal
402	4	NMOS			●	COPS family as second source of NS
410	4	NMOS			●	
410 L	4	NMOS			●	
411 L	4	NMOS			●	
420	4	NMOS			●	
420 L	4	NMOS			●	
WD 55	4	PMOS			●	specialized timer
ZILOG						
Z8	8	NMOS			●	
Z 80	8	NMOS	●			
Z 8000	16	NMOS	●			
Z 9000	16	NMOS	●			1982 ?

16 Bits: Second Sources

Type	First Source	Second Sources
8086	Intel	Mostek, Nec, Siemens Harris and MHS in CMOS
Z 8000	Zilog	AMD, SGS-Ates
68000	Motorola	Hitachi, Rockwell, Mostek Philips, Thomson-Efcis
9900	Texas Instruments	AMI, ITT Intermetall
16000	National Semiconductor	Eurotechnique, Fairchild

Intel-MHS Agreement

As the magazine announced a month ago (1 April issue), the agreement in the works between Matra-Harris Semiconductors (MHS) and Intel Corporation was signed and was in the process of receiving official French approval at the time of the Components Exhibition.

It is of great importance to our national integrated circuit industry, as it is designed to:

create a subsidiary with a common design; and

give MHS the capacity to manufacture NMOS Intel circuits in France, circuits which come from the design center.

The purpose of the joint subsidiary is to define and design microprocessors and related circuits in France. Under the agreement, this subsidiary firm of MHS (51 percent MHS, 40 percent [sic]) will have a French center for designing integrated circuits of the NMOS VLSI (Very Large Scale Integration) type for markets such as the telecommunications, automobile electronics, or data processing ones. Each partner will have manufacturing and marketing rights for the products designed within the company.

As regards the second source, Intel has agreed to transmit NMOS technology to MHS and will give it access to any information needed to design and manufacture the microprocessors and circuits (architecture, software and masks). In exchange, MHS will provide Intel with the Intel NMOS manufacturing data transcribed by it for CMOS. These manufacturing data will not affect the process.

Intel's NMOS products which are best suited to the European market and which come from the design center will be manufactured by MHS in Nantes. Finally, the French administration will give its approval on a stage by stage basis to the products manufactured simultaneously by MHS and Intel in NMOS or CMOS technology.

9805
CSO: 3102/279

BRIEFS

UK-JAPAN COLLABORATION--Great Britain and Japan are presently pursuing exploratory talks concerning possible cooperation (in terms of research and development) in the sector of data processing [high speed computers], telecommunications and robotics, announced Baker, the minister of technical information in the Department of Industry, who had just returned from a trip to Japan in the company of the president of British Telecom. Baker, who feels that Great Britain has a great deal to learn from Japan with respect to the application of advanced technologies, does not believe that the national manufacturers are equal to exporting on the highly competitive Japanese market, but that on the other hand British equipment, particularly telecommunications equipment, could be incorporated in the machinery sold by Japanese manufacturers. [Text] [Paris ELECTRONIQUE ACTUALITES in French 15 May 81 p 6] 9380

CSO: 3102/290

BRIEFS

GEOTHERMAL PROJECT PLANNED--Delft--Two to three percent of the energy needs of the Netherlands could be covered by geothermal energy, according to the estimates of the National Institute of Technological Research (TNO) in Delft. A TNO study demonstrated that the subsoil of the Westland region (south of the Hague) conceals beds bearing hot water at 150 degrees Centigrade, situated at a depth of from 1,500 to 3,000 meters. The Delft Institute predicts the utilization of this bed with the help of a doublet, the cost of which would rise to approximately 12 million florins (Fr 25 million). [Text] [Paris AFP SCIENCES in French 9 Apr 81 p 28] 9380

CSO: 3102/289

CUSTOM-MADE STEEL PRODUCED WITH COMPUTER RECIPE

Stockholm NY TEKNIK in Swedish 23 Apr 81 pp 8-9

[Article by Fredrik Lundberg]

[Text] Custom-made steel produced from a recipe straight from the computer, without expensive and time-consuming experimentation--this is the goal of Professor Torsten Ericsson and his research group at the technical institute in Linkoping.

Lighter sheet metal for ships is one of the applications.

"The dream is to test various steels for a certain purpose while sitting at a desk," said Torsten Ericsson, professor at the technical institute in Linkoping.

This has not yet been achieved, neither in Sweden nor elsewhere.

However, the research group in Linkoping has made some progress--it has written a computer program that uses a limited amount of input data and provides hardness and stress distributions in a massive piece of steel, regardless of how it is hardened or annealed.

This could be valuable knowledge in a time of increasing interest in alloyed steel.

"Several years ago the molybdenum price rose to several times its previous value in only a few months due to a strike in Canada," Torsten Ericsson said.

According to him that is only one example of how opinion can change on what constitutes an optimum steel. In many areas, molybdenum can be replaced by boron, chromium, or manganese.

Complicated Interaction

Since the alloy materials interact with one another in a very complicated manner, however, it is always risky to replace a tested alloy with a new one--especially if large-scale production is involved, for example in the automobile industry.

At the same time, it is precisely the finances involved in large-scale production that justify developing a refined method of choosing steel and heat treatment processes.

When nickel prices went through the ceiling 10 years ago, Volvo quickly discontinued its nickel steel, he stated as an example.

Another reason for rethinking the traditional choice of material is the rising energy prices. By using thinner but hardened sheet metal, it is possible to decrease the weight of ships and road machinery, thereby reducing fuel consumption.

No Theory For Hardening

However, producing a new steel or even determining the properties of a well known steel used for a new purpose is a complex procedure.

Even up to the thirties, i.e. during the first 3,800 years of the history of steel, there was no theory whatsoever of what happened during hardening.

It was shown that iron has two different crystal phases which interact with carbon in six distinct manners.

The overall pattern determines the strength, hardness, and corrosive properties of the steel.

However, the interaction between various alloy materials proved to be so complicated that it has been impossible thus far to discover a general formula.

Progress is now being made, however.

A computer program has now been written in Linkoping that uses various data on the conversion temperatures of the steel to provide information on the hardness and stress at various depths in a round or rectangular rod.

Temperature Model

The method is based on a model of the temperature distribution during heating and cooling. It is used to calculate the distribution of the various crystal phases, which then have an effect on the temperature. The shrinking or swelling of the various phases is used to determine the compressive stress and the tensile stress.

As a rule, compressive stresses on the surface lengthen the lifetime of the part, while tensile stresses shorten it.

The group has also calculated case hardening processes. Case hardening means that the carbon content is increased on the surface of a steel that otherwise cannot be hardened.

The calculations show close agreement with the experimental values--so close that in some cases the group has given extensive advice to industry without experimental testing.

Simplified Hardening

Saab-Scania, for example, was able to simplify the hardening of gear wheels this way.

The goal of being able to do everything by computer does not mean that the group has lost all physical contact with steel. It is also working with traditional strength tests, microscopic studies, etc.

Märkku Knuuttila of Professor Ericsson's group has developed a complete measurement system using a microcomputer and x-ray diffraction, a method for studing surface crystal lattices. (To study deeper structures, the surface of the sample is removed electrolytically several hundredths of a millimeter at a time for each new measurement.)

The detector operates by registering the diffraction of the x-rays on a high-resistance wire. Each time the wire is hit a pulse travels in each direction. The difference in the travel time of the pulses indicates the position, which is stored in digital form.

Mostly State Money

"From a strictly academic point of view, this may be seen as practical research," Torsten Ericsson said.

However, it is not sufficiently practical for the industry itself to conduct research. Thus, despite much research commissioned by the engineering industry, the research is financed mostly by state funds.

Another interesting project today is being conducted in conjunction with the mechanics association on "method-integrated" hardening, i.e. developing methods to include hardening in a rapid production process.

The most important method is induction hardening, that is heating with alternating current. The case depth is regulated by the frequency of the current. Induction hardening is a rapid and clean process compared to hardening in furnaces, which is totally dominant today.

Laser hardening will also be studied, especially for hardening in stripes or other complicated patterns.

Unique In Sweden

Torsten Ericsson's group is the only one in Sweden that simulates hardening processes using computers.

There are many similar groups abroad and Professor Ericsson hopes to work with such groups in France with the support of STU, the Board for Technical Development.

Similar research is being conducted in Japan, Germany, and Canada.

In Canada a program has been developed to calculate a simple hardness curve directly from information on the percent composition of the steel.

9336
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POSSIBLE FRENCH-SWEDISH COOPERATION IN ROBOTICS

Paris ELECTRONIQUE ACTUALITES in French 22 May 81 pp 1, 3

[Article: "Swedish Robotics Day Has Dropped a Hint on Possible Cooperation With France"]

[Text] The objective of the Swedish Robotics Day, which was held last 14 May in Paris, was to present the vast possibilities offered by robots through the Swedish experience as both user and producer. Sweden has, in fact, a fleet of 1,200 installed robots, the greatest density of robots per employee in the world (1 per 1,000 versus 1 per 4,000 in Japan). On the other hand, Swedish industry (chiefly ASEA [Swedish General Electric Corporation] and Atlas Copco) is the leading world exporter of robots (with 60 to 95 percent of its production exported depending on the type of robot). At a time when France is initiating a major effort in the automatization of production, French-Swedish cooperation in robotics seems to serve common interests.

Swedish Robotics Day, organized by the Swedish Office of Commerce, brought together approximately 300 participants, representing manufacturers, users and the administration (DIELI [Bureau of Electronic and Data Processing Industries]). The participants studied the Swedish experiments with robotics. The initial motivations, which are always with us, concerned the improvement of working conditions (tedious or dangerous tasks...), improvement of productivity, a shortage of specialized manpower, and improvement of product quality.

Robotics in Sweden has been making very rapid progress these last 10 years, with a 40 percent per annum growth rate for installations, forecasts for the 1980's making it possible to anticipate slower progress of 20 percent per year. In 1970 Sweden had 55 robot installations, a number which rose to 940 in 1979 (a year when investments reached 500 million Kronas) and 1,200 in 1980 and which will rise to 2,300 in 1985 and 6,000 to 9,000 in 1990. The use of robotics is presently concentrated in metallurgy (50 percent), mechanics (15 percent) and the automobile industry (20 percent).

With respect to the repercussions of robotics on employment, the Swedes feel that the short term effects are minor and that the employment rate in society is scarcely touched as a whole; the only ones affected are groups of individuals (the elderly...). Contrary to a widespread idea, the Swedish government has not had an interventionist policy with respect to robotics. The development in this field has been accomplished thanks to private sector initiatives.

The World Market Is Increasing at 35 Percent Per Annum

At the world level, robotics is especially developed in Japan (close to 10,000 robots, 3,000 of them "intelligent"), in the United States (4,000), in Sweden (1,200), in Germany (900), in Italy (500), in France (250), and in Great Britain (200).

The world market is still insignificant, but the rate of expansion is on the order of 35 percent per year. In fact, the market is divided fairly equally into three blocks of 4,000 robots each in Europe, the U.S.A. and in Japan (for robots of the same technology).

It is Europe that will experience the greatest increase in robotics; it is probably France which will install the most robots (predicted growth of 100 percent in the next 3 or 4 years).

Swedish industry presently covers 35 percent of the European market, the rest being handled by Unimation (the largest American producer) with 23 percent and Trallfa (Norwegian) with 17 percent. In another connection, ASEA controls approximately 5 percent of the American market, on which it places 100 to 150 robots per year. In France ASEA supplied some 50 robots and Atlas Copco, 2 (painting) robots.

Industrial robots (which are defined as "manipulators with multiple reprogrammable functions, designed to manipulate materials, parts, tools, gripping devices, for diverse programmed movements, in order to perform varying tasks"), are divided into manipulation robots (the most numerous), process robots and assembling robots. Foremost among the process robots are arc- and resistance-welding robots, as well as painting and surface-coating robots.

Convergent Interests

On behalf of the Swedish minister of industry, Martin-Lof expressed hope for the advent of French-Swedish cooperation in robotics. In order to develop more "intelligent" robots, advanced sensors (especially for vision and sensitivity) are needed, he explained. In another connection, robots are presently being sold in separate units, and their integration is left to the clients, but the trend is to furnish robot systems on a turnkey basis. "These two subjects--the development of sensors and systems integration--can serve as points of departure for a discussion between French and Swedish specialists on possible cooperation projects," he emphasized.

DIELI responded indirectly to these overtures by hinting that the administration was not opposed to French-Swedish cooperation in robotics, and bringing up the complementarity of action in the two countries. The apparatus installed by the administration (automatization of the production process and CODIS [Committee for Orientation and Development of Strategic Industries] action) was recalled, as well as the package of Fr 1 billion in loans allowed for robotics.

The French Industrial Robotics Association (AFRI), which brings together 15 robot manufacturers, likewise decided in favor of international cooperation. Nonetheless AFRI lay emphasis on French backwardness in terms of use and production (French manufacturers supply only one-third of national needs).

In fact, taking into consideration the policies initiated with respect to automatization of production, which should lead to an explosion of the fleet of robots, it is evident that Swedish industry is interested in the French market. For their part, the French manufacturers incontestably have something to contribute in terms of studies on intelligent robots, sensors, logic and systems integration (equipment accounts for only 40 percent of the price of an installation). The interests of both countries are thus convergent and argue in favor of cooperation.

9380
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INDUSTRIAL TECHNOLOGY

BRIEFS

MORE FUNDS TO SENSORS--The French Research Ministry wants to develop domestic expertise on sensors. State subsidies of about 18 million francs (approximately the same number of kronor) are being granted during a 10 year period and 5.6 million is being distributed already this year. Most of the funds will be used to develop sensors for medical purposes, to produce sensors for industrial process controllers, and for general sensor technology. Domestic production of sensors presently covers only about 40 percent of the French market. [Text] [Stockholm NY TEKNIK in Swedish 23 Apr 81 p 30] 9336

CSO: 3102/288

SCIENCE POLICY

ITALIAN RESEARCH MINISTER OUTLINES AIMS, FUNDING OF R & D

Paris AFP SCIENCES in French 30 Apr 81 pp 4-6

[Text] Milan--Italy's budget this year for R & D, all fundings (state, private, industries, etc.) included, will exceed 3,600 billion lire, or around Fr 18 billion, according to figures released by Italian Research Minister Pier Luigi Romita on 24 April during a visit by a group of European science journalists to the Alfa Romeo research center and Balocco test track.

Mr Romita revealed on that occasion that the Italian government will shortly launch some special automotive and aeronautics R & D support programs that are also to be funded under the National Energy Research Plan (PNRE), which was drawn up by a special committee of experts from the Ministry of Research and which will be submitted shortly to the Italian Parliament.

Lastly, Mr Romita stated that efforts will be made to speed up the granting of loans to industries involved in R & D through the simplification of bureaucratic procedures, that the university reform law, which provides specifically for links with industry by facilitating the mobility of researchers, will finally go into effect, and so forth...

With regard to the funding of R & D, a special fund--the IMI [Italian Credit Institute]--has been created to aid industrial research. It will provide credits totaling some 450-500 billion lire (over Fr 2 billion) in 1981, and totaling 1,900 billion lire (about Fr 10 billion) over a 3-year period.

The statistics for 1980 show that, of the 3,182 billion lire spent for R & D, 30.2 percent was spent by private industries, 21 percent by state-owned industries, 11.6 percent by universities, 11.6 percent by the CNR [National Research Council], 10.3 percent by the CNEN [National Nuclear Energy Commission], 4.6 percent by the different ministries, 4 percent on international programs in which Italy participates, 3.1 percent was granted to ENEL [National Electric Power Agency], 1.9 percent went to military research, and lastly, 1.7 percent was used to finance the INFN [National Institute for Nuclear Physics].

In 1980, 75,339 persons were employed full time in R & D, including 32,858 researchers (16,910 in public laboratories and 15,948 in private ones).

As far as specifically concerns the automotive industry, which is considered one of Italy's priority industries, Mr Romita indicated that in 1981 it will receive a total of 600 billion lire (Fr 3 billion) from the Technological Innovation Fund being planned by the government. The minister added that further fundings will follow in succeeding years.

Addressing the European science journalists, Mr Romita emphasized two significant points with respect to the automotive industry, the "locomotive" of Western industries.

On the one hand, Mr Romita stated that, "by comparison with the aid policies being implemented by the other European countries, as well as by the United States and Japan, with regard to the automotive and aeronautics industries, Italy's financial aid to these two industries has been insufficient to date, and at the very least inadequate to enable them to adapt to the rather critical evolution of the international markets."

On the other hand, Mr Romita deemed "indispensable" a cooperative effort among European automotive firms in the field of research, without which, the Italian Research Minister stressed, "there would be a dissipation of efforts producing limited results at best."

Mr Romita said that the European automotive industry "still maintains a slight lead over those of the United States and Japan, particularly insofar as concerns the quality and performance of vehicles, but that to keep it, an innovational effort, the introduction of electronics, research on combustion in engines, etc... are vital."

9238
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CODIS BEGINS FUNDING HIGH-TECHNOLOGY PROJECTS

Paris ELECTRONIQUE ACTUALITES in French 22 May 81 p 2

[Article: "Twenty-Eight Projects Have Already Been Accepted by CODIS"]

[Text] Since its creation in October 1979, the Committee for Guidance and Development of Strategic Industries (CODIS) has accepted 28 applications, 14 of which have already been signed, for industrial projects in advanced sectors.

Andre Giraud, the minister of industry of the outgoing government, stated on Monday before the press that the projects accepted represent Fr 15 to 16 billion of investments for 1980 to 1985 and will represent Fr 23 billion of turnover by 1985. They will have benefitted from Fr 2 billion of public assistance in different forms.

These projects involve the fields of office machinery, electronics, underwater studies, robotics, heating regulation and heat pumps, and finally, the bioindustry.

The aid granted by the government through the intermediary of CODIS supports the efforts of the shareholders' own funds, and it is always lesser than or equal to it in volume. It is a question of promoting the creation of leading enterprises in the strategic sectors which will represent several trillion francs of turnover for the world market as a whole in 1985. France can set itself the objective of controlling 10 percent of this turnover, or Fr 100 billion (instead of the Fr 30 billion presently realized in these activities).

Nothing in Electronics for the General Public

It should be noted that the minister of industry declined to give the slightest indication of the origin of the projects accepted. It is known, however, that no project involving electronics for the general public has been accepted at present.

The chief objectives have been attained in the field office machinery, as of this writing: the projects backed should make it possible to control between 10 and 15 percent of the world market for office machinery as early as 1985. Projects of more than 10 PMI [small and medium industries], for which the risks are equal to the development prospects, are also under study. Once these projects are accepted the theme can be considered closed and a new theme (pure chemistry) opened.

As far as robotics is concerned, four flexible workshop pilot projects, including a particularly exemplary one with a group of PMI manufacturers, have already been approved; a special procedure common to ANVAR [National Agency for Valorization of

Research] ADI and ADEPS [Agency for the Development of Automated Production] is being set up in order to participate in the financing of flexible workshops on the basis of simple rules (50 percent of the cost overruns would be taken over by the state); 17 projects are in the process of being examined.

The recovery of the trade balance with respect to heating regulation (90 percent of the equipment purchased in France is imported at present), will be obtained during the 1980-1985 period; in the field of heat pumps, the current selection should result in 2 or 3 centers of international stature.

In another connection it should be noted that the number of projects under study is increasing rapidly, especially those coming from PMI (three-quarters of the projects); at present some 50 projects are under study, representing Fr 15 to 20 billion CA [turnover] in 1985 and 7 to 8 billion Fr of investments, most of it in sectors other than electronics.

9380
CSO: 3102/290

TRANSPORTATION

DESIGN CHANGES CONTINUE TO IMPROVE VERA PROTOTYPE

Paris L'ARGUS DE L'AUTOMOBILE in French 16 Apr 81 p 5

[Text] VERA is real. We met her on 3 April... This prototype of an economical automobile was presented on schedule by Peugeot's engineers to its principal sleeping partner, the Energy Economies Agency [AEE], in whose name Mr de Wissocq and Mr Poulit warmly congratulated them; for VERA has shattered the most optimistic of expectations in regard to consumption: Instead of the expected 25 percent economy, it actually delivers 36 percent!

The business of producing it was carried out with prompt dispatch, considering that the basic decision was only taken in November 1979.

At that time, the AEE, Renault and Peugeot signed a contract to study and design a prototype that would define the "Elements of an Economic Vehicle" [EVE], which acronym was immediately adopted by Renault for its quickly submitted maquette of the future economic vehicle. Peugeot named its own VERA, its acronym for "Applied Research Economic Vehicle," and submitted its general outlines in January 1980.

The approaches of our two major builders were, although complementary, nonetheless very different. The Regie played "to win," creating a new vehicle with aerodynamic body, a variable-speed-drive automatic transmission, etc. Peugeot played "to place," taking a 305 as its base. Some may say that Renault is playing the long term, and Peugeot the short term, but the fact remains that while EVE is somewhat "the Arlesienne" of the moment, VERA has been unveiled, rolling and at different stages of her evolution, to the press. It has thus been possible to follow in detail the improvements being wrought in her aerodynamics and the reductions in her weight that have now defined her new motorization.

The gain from such an approach, financed 50 percent (of Fr 14 million) by the AEE, has been that individual techniques, all of which were known, were thus assembled together, evaluated, and their production costs worked out. The La Garenne design department engineers have now mastered a very clear and sound approach to the design and production by 1984-1985, of vehicles that will be perfectly economical but that will be a lasting pleasure to drive.

Wind Sculpturing

As he seats himself behind the wheel of VERA, the owner of a 305 will hardly experience any surprises: Visibly, nothing has changed within, from the instrument panel to the interior space; yet...everything about VERA is different.

To reduce the amount of energy needed to propel a vehicle:

--its aerodynamics must be improved;

--its weight must be diminished;

--the energy efficiency of its engine must be increased;

--Its mechanical and road friction (tire) losses must be diminished;

--its transmission must be optimized within these new parameters.

Its consumption is thus diminished at high speeds (aerodynamics and transmission), during acceleration (engine and transmission), and at slow speeds (tire friction), all improvement factors contributing to each other nonetheless. Although the 305GL tips the scales at 925 kg, a creditable weight considering its passenger comforts and its reliability, its C_x (aerodynamic coefficient) of 0.44 is frankly poor. How would Peugeot go about having VERA resemble a 305 while meeting the specifications, that is, a C_x of 0.36? The answer can only emerge from the Saint Cyr wind tunnel (ownership of which is shared by the CNAM [Conservatoire des Arts et Metiers], Renault and PSA [Peugeot S.A.], where precise measurements can be made on actual vehicles.

Everything Is Important

Each improvement was thus tested and progress made step by step--a fantastic fight--without changing the elements that could have yielded a substantial gain immediately: Abandonment of the "three-part" body (with trunk) and of the original windshield was never intended.

The accompanying figures [Figs A and B] illustrate the principal milestones in the development of VERA and the numerous expedients (immediately mass-producible) that eventually yielded an overall C_x gain of 12.2 points:*

[Numerals are keyed to both figures]:

1. Upswept trunk and aileron. Front and rear windshields bonded without external joints. Water drain-channeling eliminated and lateral air extractors modified; gain: 4.5 points;

2. Headlights with airtight fairing: 0.6;

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* 1 C_x point = .01 C_x.

3. Front-end deflector under bumper (cowling): 1.6;

4. Airtightness of frontal surface: 1.1;

5. Modified grille and radiator air scoop: 0.4;

6. Fairing of flooring under rear seating compartment: 0.8;

7. Wheel cover disks in the plane of the tire sidewall: 0.9;

8. Front window deflectors: 1.7;

9. Lateral lower-body deflectors and fairing of rear wheel hatches: 0.4;

10. Wheels equipped with low-rolling-resistance tires: no gain;

11. Roof deflector surrounding the rear windshield and extending over the fenders: 0.2.

And the results are: the VERA C_x reduced to 0.318, the equivalent of the best French "two-part" body, the Citroen GSX3. Subsequently, a more precise measurement, showing that the area S of VERA's maximum cross section is slightly greater than planned (but close to that of the 305), yielded a C_x of 0.306, an astonishing performance for a "three-part" body!

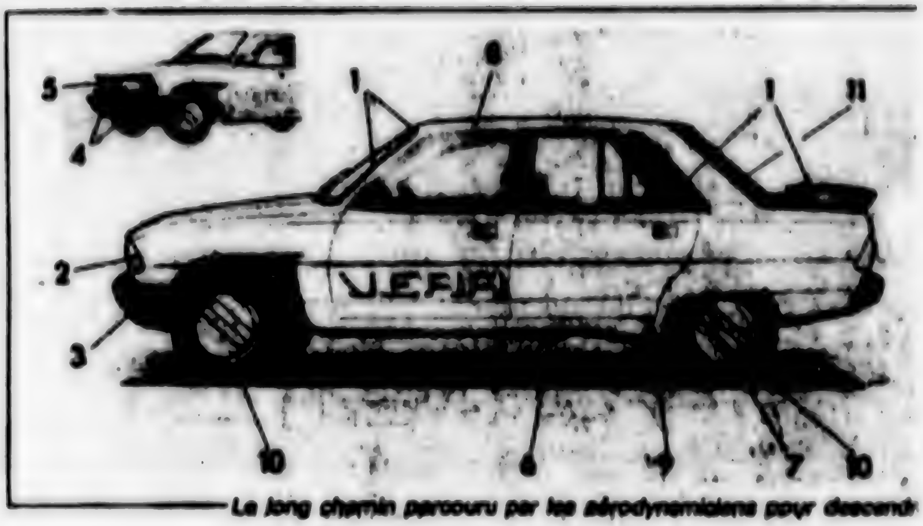
A Day-To-Day Effort

As of 1 January, the balance sheet was not that favorable: Between the bodies exhibited at Belchamp and at the Salon de Paris and the current VERA, the roof deflector (11), with its 0.2 gain, has been added! This accessory, dear to the heart of Pininfarina, which used it on all its models (for aesthetic reasons) during the 1960's, makes it evident that nothing was overlooked!

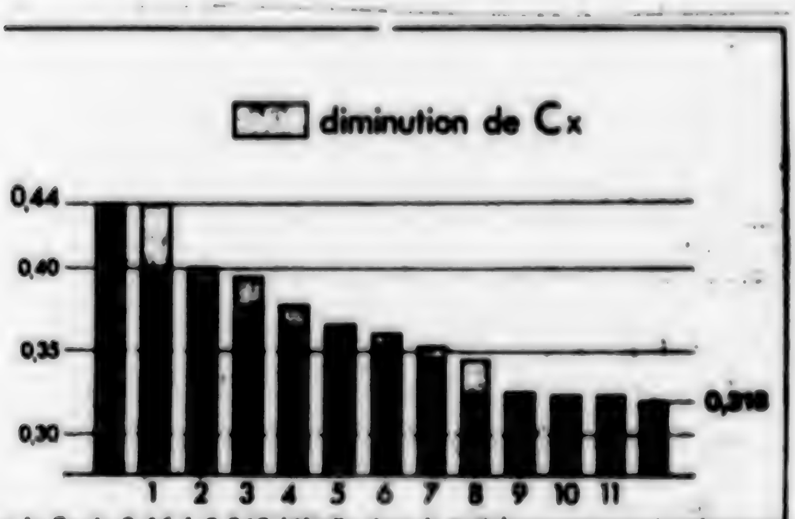
The most significant findings concern the grille, which is now totally airtight (as are also the headlights) and is equipped with a well designed Venturi opening to cool the radiator.

The course of the vortexes that begin at the base of the windshield and beneath the engine and meet at the level of the rear wheels is now marked by devices (deflectors, fairings, air extractors, spoiler) that render them harmless...

In short, except for the "extractors" located behind the front wheels, which will quickly become soiled and lose their paint, VERA's body is superb and more beautiful than that of the original 305! Could a kit not be produced (Chardonnet has done it for its Lancia Turini) consisting of grille and spoilers, wheel disks, deflectors and aileron? Would not many owners of 305's be happy to "customize" their cars, recovering the price of the kit through gasoline economies?



Le long chemin parcouru par les aérodynamiciens pour descendr



e le Cx de 0,44 à 0,318 (détails dans le texte)

The long road traveled by the aeronautics engineers to lower the C_x from 0.44 to 0.318 (see text for details).

Costly Economies

In automobile design, the last few grams squeezed out, the last horsepower gained are always the most costly! We hasten to say that the exceptional performance of Peugeot's engineers, a gain of 185 kilos, would, if VERA were to be marketed, result in a price increase of around 30 percent. But at this point, is it not the important thing to have reduced her weight from 925 kg to 740 kg? The reduction of her costs can be addressed later...

This weight improvement has been achieved without altering the strength (including impact resistance) of the supporting structure: VERA is therefore reliable. The gains have been obtained mainly in nonsupportive moving parts, but the details are even more revealing:

--The main body frame is of "HLE [high-elastic-limit] steel" sheet;

--The front-end frame is plastic;

--The left door is of SMC [expansion unknown] (a glass-fiber-reinforced polyester): The front door, weighing 7.6 kg (a gain of 3.5 kg) can be produced industrially. The left doors _as published_ are of aluminum (no industrial future);

--Hoods are of SMC (engine hood weighs 7 kg, a gain of 5.4 kg).

In all, VERA's body saves 53.3 kg, in addition to 25 kg gained on appointments and accessories: polypropylene seats (-1.4 kg), thinner windows (3mm thickness instead of 4 mm), polycarbonate headlights, etc.

A 104 Engine

With a body thus lightened, it became possible to use a smaller-cylindered engine. A 104GR engine therefore took the place of the original 305 engine, a gain of 18 kg, but it was adapted to its new functions, providing an additional 4.3-kg weight reduction (engine flywheel, magnesium carburetor, stainless steel intake manifold, electrical equipment, etc.), to which a further reduction of 11.7 kg was added by way of its ancillary equipment (radiator, hoses...). To improve the weight gain still further, there was no recoiling from sacrifices: no servo-assisted brakes (no longer necessary with the reduced weight), pedal assembly of aluminum and synthetic materials, Michelin synthetic resin wheels, special front- and rear-end suspensions, special gear-shift mechanism, etc.

Recapping: Engine/transmission/accessories 34.0 + mechanical cross bracing 10.6 + front-end gear 11.9 + rear-end gear + components 7.9 + wheels 15.3 + appointments and accessories 25.1 + structure and miscellaneous 52.3 + battery 5.1 = 185 kg.

Optimizing

Associated with a 5-speed transmission, providing a road speed of 40 km/hr at 1,000 rpm in 5th, VERA's XY15 engine is no longer at all a 104! With a cylinder capacity increased to 1,452 cm^3, it develops 63 hp at 4,500 rpm with an exceptional torque of 11.8 m-kg at 2,500 rpm. The curve is "flat, so that a minimum of 10 m-kg is available at 1,000 and 4,500 rpm, which is prodigious and enables brisk getaways from idling as well as creditable accelerations at higher road speeds. Thus VERA is not one of those "hypocritical cars" that only perform well between 90 and 120 km/hr; Mr Poulit exhibited this: He was able to take off at 60 km/hr in 5th and register, on a 70-km/hr road test, a consumption of 4.6 liters versus 7.3 for the original 305.

While the work on the cylinder head, the camshaft, and the reduction of frictions bore their fruits, the principal innovation was in regard to the ignition. It is all-electronic (two probes on the engine flywheel, one vacuum bleed point in the manifold) and is called "carded": It stores in a memory the optimized ignition advance as worked out on the test bench for each operating condition (power requirement and rpm). The electronic black box developed by Peugeot (many other leading manufacturers have already done so) contains 1,024 ignition advance points and a transistor power stage that delivers the spark to the plugs at the optimum moment.

It not only lowers fuel consumption but also diminishes pollution; its only flaw is its production cost.

Favorable Balance Sheet

Weight has come down 20 percent; C_x by 27.7 percent; $S C_x$, the product of the C_x and maximum cross-sectional area, by only 27.4 percent, attesting to the importance of Peugeot's having adopted the new Michelin TR "E", a broader tire: Although it results in a loss of a few square centimeters of S, the tradeoff in terms of performance at low speeds is such that VERA, already well ahead of the planned objectives, totally pulverizes them! The UTAC [Technical Union for Automobiles, Motorcycles and Cycles] certifies a top speed of 161 km/hr (147 for the 305 GL), and a consumption of 4.2 liters [per 100 km] at 90 km/hr, 5.6 liters at 120 km/hr, and 630 liters in the city, as compared with planned objectives of 4.8 liters at 90 km/hr, 6.5 liters at 120 km/hr, and 7.1 liters in the city, and with the "base" figures for the 305 GL of 6.5 liters at 90 km/hr, 9.1 liters at 120 km/hr, and 9.5 liters in the city!

The gains are therefore respectively 35 percent, 38 percent and 34 percent, for a mean gain of 36 percent, or 3 liters, per 100 km. It is simply superb, the more so as VERA excels in the 400-m and 1,000-m DA [expansion unknown] tests: At 18.5 seconds and 34.9 seconds respectively, it outdistances the 305 GL, which can do no better than 19.9 and 37.7 seconds respectively. After all, is not a light, aerodynamic, well motorized car necessarily a sports car? We will have the definitive answer to this question this week, when we test VERA on the difficult Monthlery circuit.

(To be continued.)

9399
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FIVE-YEAR RESEARCH EFFORT AT ALFA ROMEO

Paris AFP SCIENCES in French 30 Apr 81 pp 6-7

[Text] Milan--The Italian Alfa Romeo group, inclusive of all its automotive and aeronautics activities, expects to spend for R & D over the 5-year period between 1978 and 1982 a total of 187 billion lire (around Fr 4.7 billion).

These figures--and those which follow--were released by the group's management last week to a group of European science journalists who were guests of the Italian company. The visit was one of a series of such visits to research centers being organized periodically by the European Union of Science Journalist Associations in the different member countries. The Union is currently presided by Mr Giancarlo Masini, who is also president of the Italian Association of Science Journalists.

According to Dr E. Massacesi and his close collaborators, "Research activity, especially in the automotive sector, has become a fundamental condition to competitiveness and even to survival of the products manufactured by the group."

In 1977, a year that can be considered quite representative of the situation, the group employed a total of 1,418 persons full time in R & D, to which must be added 420 others who devoted 40 percent of their time to R & D.

The group's R & D activities are concentrated in Arese, Milan, Naples and Livorno under various parallel managements. Alfa Romeo Auto gets the lion's share of the R & D funds. In 1981, for example, it will spend 35.6 billion lire as compared with 8.3 billion by Alfa Romeo Avion and 1.2 billion by SPICA [expansion unknown], which manufactures components and which conducts research, for example, on ceramics, on new computer-designed spark plugs, on electronic injectors, etc...

The three major research sectors in the automotive domain are engines, general shapes (aerodynamics, comfort, safety), and mechanical parts.

Alfa Romeo conducts major research on the theoretical and experimental aspects of combustion. In cooperation with the CNR [National Research Council], modular engines, enabling a vehicle to run, for example, on two cylinders in the city instead of four, for reasons of economy, have been developed.

With funding from the European Communities, a 6-month test, with 10 taxis so equipped, will be run in Milan in the near future.

A special effort is being deployed by the firm on the use of electronics, or "autonics," for the control of combustion as well as for the vehicle's other basic functions. Strategies in this domain have not yet been fully defined, however, as ideas on designs for engines, new combustion chambers, new transmission gear, etc... are mushrooming, to say nothing of the problems that must be resolved as to conditions under which the necessary electronic components, the microprocessors, must be manufactured.

What is worthy of note is the many cooperative links that have already been forged between Alfa Romeo and the Italian research centers, and some even with foreign ones, in Great Britain, Germany, and the United States.

On its Balocco test circuit, near Milan, and in its associated laboratories, much testing is going on with respect to road traction and safety during collisions, as well as on a turbine engine. Commencing the first week in May, moreover, Alfa Romeo is going to take part in a Formula 1 competition on the Imola circuit, under its own colors and with turbo cars.

9399
CSO: 3102/298

BRIEFS

ELECTRIC VEHICLES, SOLAR SYSTEMS--The Lucas and Chloride programs for the further development of their electric-powered vehicles will be merged under a new company to be named "Lucas Chloride EV Systems Limited." The British government is committed to furnish it substantial financial aid over a 5-year period. Lucas Chloride EV Systems Limited will be based in the premises of Lucas on Evelyn Road, Birmingham. R. A. Dale, general manager of Lucas Batteries Limited, will be the president of the new company. Lucas Industries will own 60 percent of the capital shares and the Chloride group will own 40 percent. The new company's activities will include research, development and marketing, and its aim will be to develop the components and systems required for high-performance electric road vehicles, in collaboration with leading automobile manufacturers. BP and Lucas Industries have announced the formation of a jointly owned subsidiary for the manufacture and marketing of solar energy systems. The stock of the new company--Lucas BP Solar Systems Limited, based at Haddenham, Buckinghamshire, England--will be owned half by BP and half by Lucas, and its activity will bear on photovoltaic systems. The company will concentrate its efforts on applications for which practical alternatives do not exist in the sectors of communications, traffic control signaling, installations in isolated locations, etc. One of the first major projects to be undertaken will be the design and development of the first British solar power plant, interconnected with the network, which is to be built with support from the CEGB (Central Electricity Generating Board) on the Marchwood site near Southampton. Its capacity will be 80 kw. This pilot plant is to be operational in 1983. Lucas Energy Systems, a Lucas subsidiary, which has devoted its efforts to solar energy for the past several years, will host the new company, and Mr Philip Wolfe, its general manager, will manage both companies. [Text] [Paris L'ARGUS DE L'AUTOMOBILE in French 7 May 81 p 10] 9399

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June 29, 1981